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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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William R. Dudley

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3M INNOVATIVE PROPERTIES COMPANY
PO BOX 33427
ST. PAUL, MN 55133-3427

EXAMINER

CREPEAU, JONATHAN

ART UNIT

PAPER NUMBER

1746

DATE MAILED: 05/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/876,567

Applicant(s)

DUDLEY ET AL.

Examiner

Jonathan S. Crepeau

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2004.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 and 33-66 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 59 is/are allowed.
- 6) ☒ Claim(s) 1-31, 33-58 and 60-66 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2/23/04.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 1-31, 32-56, and newly added claims 57-66. Claim 59 is allowed, and claim 6 contains allowable subject matter. Claims 1-24, 57, and 58 are newly rejected under 35 USC § 112, first paragraph, as necessitated by amendment. Claims 1-31, 33-47-56, although they have been amended, remain rejected for substantially the reasons of record, and claims 57, 58, and 60-66 are also rejected for these reasons. Accordingly, this action is made final.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-24, 57, and 58 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1 and 57 have been amended to recite that the substrate comprises a "release liner." The closest support for this recitation is found at page 18, line 10, which discloses "silicone release liners." However, there does not appear to be sufficient disclosure

that the Applicants had possession of release liners made of materials other than silicone, which are encompassed by the amendatory language. As such, the language is considered to constitute new matter into the application.

Claim Rejections - 35 USC § 102

4. Claims 1, 5, 7-9, 16-24, 47-54, 57, and 58 are rejected under 35 U.S.C. 102(e) as being anticipated by Carlson (U.S. Patent 6,488,721).

Regarding claim 52, the reference teaches a battery component (38, 39) comprising an anode (710), a separator (102), a cathode (201), an edge material (301) contacting an edge of the cathode, and a cathode current collector (401) (see Fig. 10, col. 32, line 15 et seq.). Regarding claim 1, a substrate (2) is coated with a separator material (102), followed by an edge material (301) and a cathode material (201), thereby “improving” the thickness profile of the cathode (see Fig. 6). Regarding claim 5, the edge material acts as a physical boundary. Regarding claim 47, the substrate may also be coated with a cathode material (201) and then the edge material (301) such that the cathode material and edge material touch each other (see Fig. 5). Regarding claims 47, 52 and 54, the edge material is capable of functioning as a barrier to moisture and light. Regarding claims 23 and 24, the cathode and edge layers may be solvent coated (see col. 27, line 10). Regarding claim 16, the cathode material edge is approximately square and has a uniform thickness profile and a width of less than 200 microns (see col. 18, line 2; Fig. 5). Regarding claims 17, 18, 21, 22, 48 and 49, the cathode and edge layers may be extrusion coated (see col.

27, line 15). Regarding claim 17, the cathode material layer may be calendered (see col. 17, line 57). Regarding claims 19 and 53, the edge material may comprise an electrically insulating thermoplastic polymer such as an ethylene, propylene, or urethane (see col. 25, line 10). Regarding claims 50 and 51, the wet and dry coating thicknesses of the edge material are approximately equal to the wet and dry coating thickness of the cathode material (see Fig. 5; col. 25, line 1). Regarding claim 20, the cathode material comprises an electrode active material, an electrically conductive material, and an ionically conductive material (e.g., ionically conducting polymer, electrolyte salt) (see col. 17, line 60; col. 29, line 43 et seq.). Regarding claim 7, the cathode material and the edge material are “immiscible” because distinct layers are formed upon coating. Regarding claim 8, the shape of the cathode edge is inherently altered by the presence of the edge material. Regarding claim 9, the cathode thickness is in the range of 5 to 200 microns (e.g., 100 microns), which anticipates the ranges of bulk and edge cathode thicknesses. Regarding claims 1, 57, and 58, the substrate (2) may comprise paper, a metal foil, or a silicone release liner (see col. 16, line 61 et seq.). Regarding claims 47 and 52, the separator layer in contact with the cathode may comprise a solid polymer electrolyte (see col. 29, line 43).

Thus, the instant claims are anticipated.

Claim Rejections - 35 USC § 103

5. Claims 52-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Song et al (U.S. Patent 6,521,382) in view of Carlson.

Regarding claims 52 and 55, Song et al. teach a battery in Figure 3 comprising the following sequential layers: anode (1), first electrolyte (separator) (4), first cathode (6), cathode current collector (8), second cathode, and second separator. Regarding claim 52, the electrolyte is a solid polymer electrolyte (see abstract).

The reference does not expressly teach that an edge material contacts the edge of the cathode, as recited in claim 52.

As set forth above, Carlson teaches a battery comprising a polymeric cathode edge material layer (301).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated by the disclosure of Carlson to use an edge material in the cathode of Song et al. In column 23, line 5, Carlson teaches the following:

This absence of full coverage of the cathode active layer directly over the surface of the microporous separator layer or, alternatively, indirectly over the surface of a protective coating layer which is over the microporous separator layer may be beneficial to allow the coating of edge insulating layers in desired patterns on the separator layer and in contact with a portion of the cathode active layer to reduce the possibility of short-circuiting of the electrodes when fabricated into an electrochemical cell. This is also typically

Thus, the coating of edge insulating layers in the cathode of Song et al. would be beneficial to help prevent short-circuiting of the electrodes. Regarding claims 52-54 and 56, the edge material would function as a light and moisture barrier, and would further prevent contact between the anode and the cathode current collector.

6. Claims 2-4, 10-15, 25-31, 33-46, and 60-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carlson in view of Liu et al (U.S. Patent 6,159,544).

Carlson is applied to claims 1, 5, 7-9, 16-24, 47-54, 57, and 58 for the reasons stated above. Further, regarding claim 25, the edge material may be non-viscoelastic (see col. 27, line 17). Regarding claim 44, Carlson teaches a slitting step in column 26, line 16.

However, Carlson does not teach that the cathode and edge layers are coated substantially simultaneously by a die coater having at least two slots, as recited in claims 25, 29, 36, and 39.

Liu et al. is directed to a die coater having multiple substantially parallel slots for coating adjacent layers of different material on a substrate (see abstract; Fig. 1). Shims are arranged in the slots to form the stripes (see col. 4, lines 40-46).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use the die coater of Liu et al. to form the cathode and edge layers of Carlson. In column 2, line 32, Liu et al. teach that the disadvantages of the prior art include "non-uniform width of stripes" and "ambiguous interfaces of coating solutions." Further, in column 2, line 43, the reference teaches that an object of the invention is to provide "distinct interfaces" between stripes. Accordingly, this would provide the artisan sufficient motivation to use the die coater of Liu et al. to form the cathode assembly of Carlson.

Regarding the ranges of separation distance and substrate speed recited in claims 11, 12, 30 and 31, these ranges are not considered to distinguish over the references. A small (e.g., <5 mm) separation between slots would be necessary to obtain the touching stripes disclosed by Liu

et al. Additionally, the substrate speed may be adjusted by a skilled artisan depending on the viscosity of the coating mixtures and desired thickness of the coatings.

Regarding claims 41-43, the die of Liu et al. may be considered to be a “dual slot extrusion die,” a “slot fed knife die,” and a “fluid bearing die.” The definition of each type is provided in column 7 of U.S. Patent 6,051,297 (Maier et al). The main differences are in the viscosity of the material being coated and the arrangement of the ancillary rollers, but neither of these features affect the basic structure of the die. Thus, the die of Liu could be used to perform any of these coating processes.

Regarding claims 2 and 3, which recite that the coated cathode material comprises a tapered edge, this limitation is also not considered to distinguish over the references. Although the drawings of Carlson schematically show a square-shaped cathode material coating edge, in actual practice this edge would be likely to have a slight taper (i.e., the edge would not be 90 degrees in relation to the substrate). Furthermore, it has generally been held that a change in shape is not sufficient to distinguish over the prior art unless a new or unexpected result is shown. See MPEP §2144.04 (IV).

Response to Arguments

7. Applicant's arguments filed February 20, 2004 have been fully considered but they are not persuasive. Applicants assert that “the Carlson reference fails to describe a separator that is a solid polymer electrolyte.” However, the reference does in fact teach such an electrolyte. See col. 29, lines 13 and 43 in particular. Similarly, Applicants assert that the Song et al. reference

does not teach a solid polymer electrolyte; however, it is submitted that the reference also teaches such an electrolyte (for example, in the abstract).

Applicants further assert that the Carlson reference does not anticipate amended claim 1 because the cathode material is coated onto a “microporous” material, and not one of the claimed substrate materials. In response, it is submitted that the reference anticipates claim 1, even as amended. As set forth above, Carlson teaches several of the claimed substrate materials in column 16, line 61 et seq. It is acknowledged that Carlson discloses coating a layer of microporous separator material (102) onto the substrate (2), and then coating the cathode and edge materials (201, 301) onto the surface of the separator. However, it is submitted that Applicant’s claimed process is open-ended and does not exclude the step of coating a separator material onto the substrate before coating the cathode material. Alternatively, claim 1 does not specify that the cathode material is in direct or intimate contact with the substrate. As such, claim 1 is still properly anticipated by the Carlson reference.

Regarding the Liu reference, Applicants assert that “[t]he Office action does not include an explanation of how one of skill would have reasonably expected that the method of the Liu et al. reference, described in detail only for glycerol solutions and a single PVA solution, could be successfully applied to battery components such as those of claim 29.” In response, it is submitted that the artisan would have a reasonable expectation of success in using the apparatus of Liu et al. to coat the layers of Carlson. First, it is noted that the disclosure of Liu et al. is not limited to Examples and preferred embodiments. See *In re Susi*, 440 F.2d 442, 169 USPQ

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423 (CCPA 1971); MPEP §2123. Additionally, the disclosure in column 6 of Liu et al. relates to the various viscosities and other properties of the coating solutions. The artisan would be sufficiently skilled to take these teachings into account when using the apparatus of Liu to coat the layers of Carlson. For example, it appears to be advantageous to use materials of similar viscosity. Both the cathode layer and edge layer of Carlson may contain substantial amounts of polymeric material (see col. 20, line 6 et seq. of Carlson in particular). As such, it would be well within the skill of the art to match the viscosities of the cathode and edge material when coating the two layers. It is further noted that in col. 27, line 16, Carlson teaches that “[t]he liquid coating mixture may have any desired solids content that is consistent with the viscosity and rheology that is acceptable in the coating application method.” Accordingly, there is still believed be sufficient motivation and a reasonable expectation of success to use the apparatus of Liu to coat the layers of Carlson.

Allowable Subject Matter

8. Claim 59 is allowed.
9. Claim 6 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and if the rejection under 35 USC §112, first paragraph was obviated.

10. The following is a statement of reasons for the indication of allowable subject matter:

Independent claim 59 and dependent claim 6 each recite, among other features, that the edge material and cathode material maintain a separation after being coated onto the substrate.

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Carlson, the closest prior art, does not teach or fairly suggest this feature. As such, claim 59 is allowed, and claim 6 contains allowable subject matter.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (571) 272-1302. The phone number for the

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organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jonathan Crepeau
Patent Examiner
Art Unit 1746
May 25, 2004